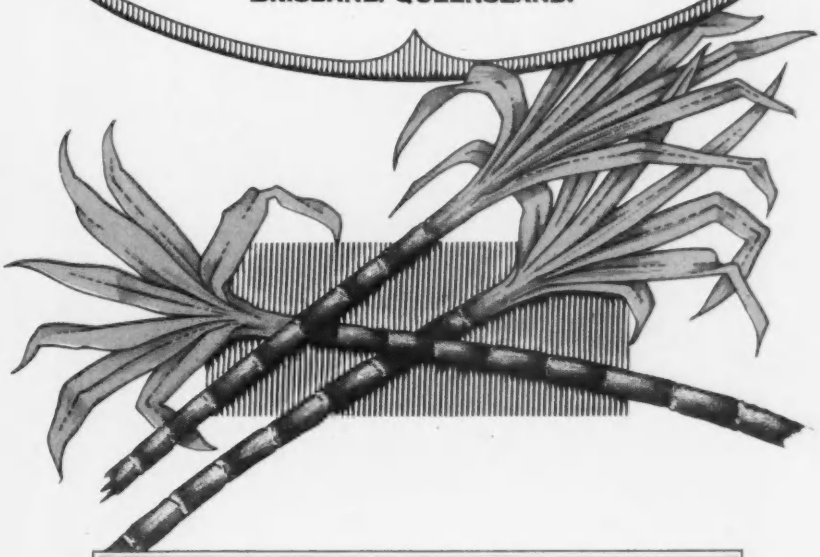
DEPARTMENT OF AGRICULTURE AND STOCK.

The CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY
BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE. QUEENSLAND.



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Varietal Trials,
1936 Season.

BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
HON. F. W. BULCOCK, MINISTER
FOR AGRICULTURE AND STOCK

1 JANUARY, 1937

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The
Cane Growers' Quarterly
—Bulletin—

VOL. IV 1 JANUARY, 1937 No. 3

Farm Fertility Trials.

Results of the 1936 Season.

It is now seven years since the policy of conducting fertility trials on canegrowers' lands was adopted by the Bureau. Prior to 1929, all experiments of this nature were confined to the three Experiment Stations, and the results lost a deal of weight as a consequence. The soil types embraced by a small experimental farm could scarcely be regarded as representative of an entire region.

The wisdom of the policy is demonstrated by the results which have emerged from the trials which have now been located on virtually all of the major soil types of the cane districts. The results themselves are highly varied in character and trend, and discrimination is necessary to allow the canegrower to decide what results are likely to be applicable to his conditions, and which are inapplicable. An attempt is being made to facilitate this solution by the preparation of accurate detailed soil maps of each mill area, and those for the districts from Mossman to Innisfail are now in the course of preparation.

It is pleasing to note that one does not now encounter the same hostility to the use of artificial manures, as was common a few years ago. Canegrowers now realise that the judicious use of the correct fertilizer provides one of the surest means of reducing costs of production. This applies both to the maintenance of fertility on lands of a high order of productivity, and to the rehabilitation of soils which have been depleted in fertility due to abuse.

The results for the past year cover experiments in the far Northern districts (15 trials), Burdekin (2 trials), and the Southern districts (13 trials). We regret that the pressure of work incurred in the transfer of the Mackay Station to its new site has made it impracticable for our chemist to attend to farm trials as he would wish; no results are therefore available for that area at this time, but new trials were laid down during the planting season, and further interesting data should be available in 1937.

A study of the results of the thirty experiments reported, shows very clearly what fertilizers have been able to achieve in acreage yields. A summary of all trials shows:—

	Tons.
Average yield, "Complete fertilizer" plots	38·1
Average yield, "No fertilizer"* plots	31·1
Average increase due to fertilizer	7·0

* Certain of these were partially fertilized.

There could be no stronger argument in support of the contention that our lands are deficient in plantfood supply, and that only by paying due attention to this factor will it be possible to retain them at a reasonable level of productivity.

It will be observed that all treatments recorded in this Bulletin show that only three plantfood materials were employed to supply the nutrients—nitrogen, phosphoric acid, and potash. This is desirable in the simplification of our experiments; but in the recommendations which are presented, attention has been confined to the Sugar Bureau fertilizer mixtures, which are now compounded by the leading fertilizer manufacturers, to supply the entire needs of the Queensland canegrowers. Any deficiency in nitrogen which they leave, is attended to by top dressings of sulphate of ammonia, as advised.

Values Used in the Calculations.

In computing the financial returns, a raw sugar value of £16 per ton has been assumed. This should approximate fairly closely to the final price for No. 1 pool sugar. Fertilizer prices are based on current quotations, and due allowance has been made for freight charges. A cost of 10s. per acre has been taken for costs of handling and distribution on the farm, except in the case where only one drill application is made, when the allowance has been reduced to 5s. per acre.

Acknowledgement.

We wish to record once again our keen appreciation of the kindly co-operation of the following firms, who have given tangible expression to their interest in this work by donating all fertilizer required for the trials:—

A.C.F. & Shirley's Fertilizers Ltd.

Nitrogen Fertilizers Ltd.

Pacific Potash Ltd.

We would acknowledge the valued assistance rendered in the harvesting of the trials by officers of mill staffs, and to the several growers who have generously allowed their farms to be utilized for trial purposes.

NORTHERN DISTRICTS.

Despite the early summer drought, the growing conditions for the 1936 crop were generally favourable throughout the Northern cane areas. This was particularly true for the Cairns-Gordonvale district, and very heavy cane tonnages have been harvested in those parts. Under these conditions it might be expected that response to fertilizers would be marked, and this is reflected on certain of the trials reported in the succeeding pages. In all, 15 fertility experiments were harvested; of these, 5 were quantitative trials, in which an attempt was made to determine the proportions of the various plantfoods giving the most profitable returns, while the remaining 10 sought to demonstrate the *kind* of plantfood in greatest demand. It is interesting to record the averages of the "no fertilizer" and "complete fertilizer" plots of these ten trials—

	Tons cane per acre.
"Complete manure" plots	35·3
"No manure" plots	27·8
Average increase due to manure	7·5

This summary demonstrates in no uncertain manner the absolute need for the consistent use of suitable fertilizer on all crops, if tonnages are to be maintained on the Northern cane lands.

We would again remind canegrowers in these areas that they should study only those results which were obtained from trials on soil similar to their own. This is most important, or misinformation will result. No matter how attractive a return may appear, from any given set of fertilizers, if the soil type is distinctive and different, the conclusions are not applicable.

Messrs. A. S. & F. W. Hardwick's Farm, Mowbray, Mossman.

Soil Type.—Alluvial loam. **Nature of Crop.**—First Ratoon.
Variety.—Badila. **Age of Crop.**—11 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	13·7	15·0	..	..	..
240	300	..	21·6	15·0	2 8 0	8 3 0	..
240	..	180	21·5	14·6	2 17 0	6 6 0	..
..	300	180	17·5	15·1	2 1 0	3 9 0	..
240	300	180	21·4	15·4	3 10 0	8 0 0	..

DISCUSSION.

The results from the plant crop of this trial area were presented last year. It will be recalled that crop increases due to fertilizer were slight, on the plant cane; but the figures presented here demonstrate the manner in which ratoons may benefit from fertilizers, even where the plant cane is able to secure its needs from the soil. The relative increases for the individual plantfood constituents were:—

Crop Increase due to—	Plant Cane.	First Ratoon.
	Tons.	Tons.
Sulphate of Ammonia	Nil	3·9
Superphosphate	Nil	Nil
Muriate of Potash	Nil	Nil

The outstanding value of sulphate of ammonia for ratoons is consistent with our previous findings from trials in the Mossman area, and in this district particularly the ploughing under of leguminous crops as green manure cannot be too highly commended.

On the alluvial soils of the Mowbray district we would recommend an early application of Sugar Bureau No. 1 mixtures, at the rate of 3 cwt. per acre. If green manuring has been carried out, the plant cane should require no further manurial treatment; if not, sulphate of ammonia should be applied as a top dressing, at the rate of 1½ bags per acre. Ratoons will require, uniformly, at least two top dressings of sulphate of ammonia, each of 1 bag per acre.

R. D. Rex's Farm, Mossman.

Soil Type.—Old alluvial loam. **Nature of Crop.**—Plant Cane.
Variety.—Korpi. **Age of Crop.**—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	28·6	16·3	..	..	..
360	300	..	35·4	16·0	3 1 0	5 9 0	..
360	..	180	33·7	16·5	3 9 0	5 1 0	..
..	300	180	32·2	15·9	2 1 0	1 8 0	..
360	300	180	35·3	17·0	4 3 0	9 8 0	..

DISCUSSION.

In alluvial country one may generally recognise well defined high terraces, the boundaries of which were the old river banks in earlier times, when the stream bed was at a much higher level than it is to-day. The soils of these high terraces are truly alluvial in character, though of much greater age than the lower plains now subject to flooding. One would naturally expect that the older alluvial soils would be less fertile than the newer deposits, and this is generally the case.

The benefits from manurial treatments on such soils is well exemplified in the results reported above. The following were the crop increases obtained for the individual plantfood materials used:—

Crop Increase Due to—	Plant Cane.
	Tons.
Sulphate of Ammonia	3·1
Superphosphate	1·6
Muriate of Potash	Nil

The crop was an excellent one, resulting in a high c.c.s. value, and showing a very substantial gain from the use of fertilizer. The complete mixture—applied at the rate of 840 lb. per acre—showed a profit of £9 per acre.

For soils of this type an initial application of Sugar Bureau No. 1 mixtures, followed by top dressings with sulphate of ammonia, can be expected to yield best results. The mixture should be applied at the rate of 4 cwt. per acre; a top dressing of ammonia at the rate of 1½ bags per acre would be adequate for the plant cane, but the ratoons should certainly receive two dressings, each of 1 bag per acre, at monthly intervals.

C. Russell's Farm, Smithfield, via Cairns.

Soil Type.—Old alluvial silt loam. **Nature of Crop.**—Plant Cane.
Variety.—Badila. **Age of Crop.**—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	30·1	Assumed = 13%	..	..	..
360	270	..	36·6		2 19 0	3 11 0	..
360	..	180	34·2		3 9 0	0 13 0	..
..	270	180	31·2		1 19 0	..	0 17 0
360	270	180	32·1		4 1 0	..	2 1 0

DISCUSSION.

This block had been green manured just prior to planting, and the land was in excellent condition at that time. The crop made good uniform growth, and although there appear to have been some results from the use of fertilizers, the yields were erratic and no conclusions may be drawn.

It is anticipated that the ratoons will produce more outstanding benefits from the manurial treatments. This is the class of land on which sulphate of ammonia usually produces striking results.

Messrs. Vessey and Son's Farm, Edge Hill, Cairns.

Soil Type.—Brown schist loam. **Nature of Crop.**—Plant Cane.
Variety.—S.J. 4. **Age of Crop.**—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	44·9	11·2	..	..	..
360	270	..	44·9	10·9	2 19 0	..	4 18 0
360	..	180	44·8	11·0	3 9 0	..	4 16 0
..	270	180	45·9	11·2	1 19 0	..	1 4 0
360	270	180	48·4	10·8	4 1 0	..	3 15 0

DISCUSSION.

A crop of Poona pea was ploughed under and allowed to rot before the cane crop was planted. The land was in ideal condition, and an excellent germination resulted. The crop made uninterrupted growth, and a heavy yield was recorded. It was blown down just prior to harvesting, which took place in July, when the crop was not nearly matured.

No particular benefits from manure can be detected, which is further evidence of the value of green manuring on plant cane yields. However, the first ratoon crop will derive little benefit from the green manuring treatment, and at the time of recording these figures it is reported that the young cane is already showing striking results from the treatments, notably from sulphate of ammonia.

Messrs. S. J. Page and Son's Farm, Edmonton.

Soil Type.—Schist soil. **Nature of Crop.**—Third Ratoon.
Variety.—Pompey. **Age of Crop.**—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	13·2	Assumed = 12%	..	..	..
420	270	..	23·1		3 6 0	5 10 0	..
420	..	150	29·9		3 12 0	11 1 0	..
..	270	150	15·9		1 16 0	0 17 0	..
420	270	150	32·9		4 4 0	13 1 0	..

DISCUSSION.

The full results for this trial are so outstanding that they formed the subject of a special article in the October, 1936, number of the Quarterly Bulletin. The summarised results from the plant, first, second, and third ratoon crops are repeated below:—

Crop Yields, 1933-1936.

Crop.	No Manure.	Sulphate of Ammonia + Superphosphate.	Sulphate of Ammonia + Muriate of Potash.	Superphosphate + Muriate of Potash.	"Complete" Fertilizer.
	Tons.	Tons.	Tons.	Tons.	Tons.
Plant cane	**28·2**	31·3	34·4	34·8	**37·0**
First ratoon	**13·4**	22·6	26·8	17·5	**29·6**
Second ratoon	**11·9**	21·6	22·9	13·4	**25·5**
Third ratoon	**13·2**	23·1	29·9	15·9	**32·9**
Total yield—4 crops ..	66·7	98·6	114·0	81·6	125·0
Average yield per crop ..	**16·7**	24·7	28·5	20·4	**31·3**

On this area of land substantial gains were shown for each of the individual plantfoods—nitrogen, potash, and phosphate—in the order named. The increased yields for sulphate of ammonia on all ratoon crops is particularly noteworthy. The results demonstrate, in a striking manner, how the consistent use of fertilizer may be made to produce uniformly good crops on land which is admittedly at a low level of fertility.

The treatments recommended for land of this class are:—

Green manuring should be practised consistently, when the plant cane will require only Sugar Bureau No. 2 mixture, in the drill, at the rate of 4 cwt. per acre. Ratoons will require 4 cwt. per acre of No. 2 ratooning mixture, followed by two top-dressings of ammonia, each of 2 cwt. per acre, applied at monthly intervals.

R. Hansen's Farm, Highleigh, Gordonvale.

Soil Type.—Old alluvial loam. **Nature of Crop.**—Second Ratoon.

Variety.—S.J. 4. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over NK.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
225	..	150	31·7	14·8	2 11 0	..	..
225	225	150	32·7	14·2	3 2 0	..	2 3 0
225	450	150	31·8	14·4	3 12 0	..	2 16 0
450	225	150	34·1	14·2	4 5 0	..	1 13 0
450	450	150	33·6	14·8	4 15 0	0 4 0	..

DISCUSSION.

This block was selected as a suitable area on which to test the value of heavy *v.* light applications of sulphate of ammonia and superphosphate—the two plantfood materials which usually give most profitable results on alluvial lands.

With the plant and first ratoon crops, the heavier applications showed no improvement in yield over the lighter dressings, while the second ratoon crop results recorded above are also consistent with these findings. It does appear that the 4-cwt. application of sulphate of ammonia is superior to the 2-cwt. dressings, but no definite conclusion may be drawn.

On land of this type one must recommend that an application of Sugar Bureau No. 1 mixtures, applied at the rate of 3-4 cwt. per acre, and followed by sulphate of ammonia 1½ to 2 bags per acre, will supply the full needs of each crop—either plant or ratoon.

Messrs. Hickling Bros.' Farm, Aloomba.

Soil Type.—Old alluvial loam. **Nature of Crop.**—First Ratoon.

Variety.—S.J. 4. **Age of Crop.**—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	32·6	15·5	..	..	..
270	360	..	38·6	14·6	2 15 0	0 8 0	..
270	..	180	41·6	15·1	3 0 0	6 18 0	..
..	360	180	31·6	14·9	2 4 0	..	6 7 0
270	360	180	41·1	15·3	3 17 0	7 1 0	..

DISCUSSION.

When the results of the plant crop of this trial were presented last year it was pointed out that an extra application of sulphate of ammonia had been applied uniformly over the entire area, and the results were rather indefinite for this reason.

For the ratoon crop, however, some very interesting yields were recorded. The following were the yield increases for the individual plantfood materials:—

Crop Increase Due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	9·5
Superphosphate	Nil
Muriate of potash	2·5

Sulphate of ammonia, as the material supplying nitrogen, was outstandingly beneficial, while potash appeared also to bring about a yield increase, though this is inconclusive. This effect is possibly related to the fact that these growers have consistently used basic super as a drill manure, thus supplying an abundance of phosphate and no potash.

It is therefore recommended that Sugar Bureau No. 2 mixtures be applied as an initial treatment, followed by top dressings of sulphate of ammonia so that the total application of the latter manure would be 3 cwt. per acre for plant cane, and 4 cwt. for ratoons.

Consistently heavy dressings of sulphate of ammonia such as are recommended might lead to an increase in soil acidity; but the farmer may guard against any ill effects from this cause by having our local instructor test his soil sample from time to time, and advise whether liming is required.

R. J. Watters' Farm, Gordonvale.

Soil Type.—White schist soil. **Nature of Crop.**—Plant Cane.
Variety.—D. 1135. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Sulphate of Ammonia.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	448	180	22·0	11·3	2 8 0	..	..
200	448	180	24·1	11·7	3 13 0	1 17 0	..
400	448	180	26·2	12·3	4 14 0	4 14 0	..

DISCUSSION.

There exist in parts of the North Queensland mill districts substantial areas of white schist soil, which are obviously deficient in humus, and, consequently, available nitrogen.

The experiment recorded here gives the results of heavy *v.* light applications of sulphate of ammonia on such a field. The yield increases for progressive additions of sulphate of ammonia were:—

Sulphate of Ammonia per acre.	Increase in Cane Yield per acre.
Lb.	Tons.
200	2·1
400	4·2

When it is observed that these returns were obtained with plant cane, it is safe to assume that even greater increases would be obtained with similar treatments for ratoons.

One would therefore be safe in applying an initial dressing of 3-4 cwt. of Sugar Bureau No. 1 mixtures on land of this type, and following with top-dressings of sulphate of ammonia at the following rates:—3 cwt. per acre for plant cane, 4 cwt. per acre for ratoons.

W. A. Wilkins' Farm, Mirriwinni, Babinda.

Soil Type.—Alluvial loam. **Nature of Crop.**—Plant Cane.

Variety.—Badila. **Age of Crop.**—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	42·3	Assumed = Mill Average	..	..	..
360	450	..	47·1		3 8 0	2 1 0	..
360	..	180	46·8		3 9 0	1 13 0	..
..	450	180	45·2		2 8 0	0 18 0	..
360	450	180	48·2		4 10 0	2 3 0	..

DISCUSSION.

The land was green manured prior to planting, and was in excellent condition when drilled for cane. A very good germination resulted, and the crop made uninterrupted growth until harvested in June.

The yield increases due to the three individual plantfood materials were:—

Crop Increase Due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	3·0
Superphosphate	1·4
Muriate of potash	1·1

This area was one of typical alluvial soil, on which phosphates and sulphate of ammonia might be expected to yield profitable results. It is interesting to note, however, that sulphate of ammonia has exerted the greatest influence on yield despite green manuring before planting. The favourable growing season coupled with the heavy cane crop is probably responsible for this result. One may confidently recommend the standard treatment for alluvial soils as suitable for this area; that is, an initial application of Sugar Bureau No. 1 fertilizer mixture, 3-4 cwt. per acre, followed by top dressings of sulphate of ammonia. Plant cane will require 1½ bags per acre of the latter manure, while ratoons could profit from two top dressings, each of 1 bag per acre.

C. T. Nielsen's Farm, Bellenden Ker, Babinda.

Soil Type.—Alluvial clay loam. **Nature of Crop.**—First Ratoon.
Variety.—Badila. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over NK.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
216	..	180	34·6	11·6	2 13 0	..	..
216	216	180	33·2	11·5	3 4 0	..	2 3 0
216	432	180	33·9	11·9	3 15 0	..	0 6 0
432	216	180	34·9	11·1	4 6 0	..	3 18 0
432	432	180	35·0	11·2	4 16 0	..	3 17 0

DISCUSSION.

This trial was located on an area of rather heavy alluvial loam similar to that of the South Johnstone Experiment Station, on which excellent results were recorded from phosphate applications.

The results recorded here show that phosphates were without influence on crop yield, while an application of 2 cwt. of sulphate of ammonia per acre was equally as good as the heavier dressing of 4 cwt. The lack of response to phosphate is possibly explained by the fact that the farmer has consistently employed large quantities of superphosphate.

In the light of the records presented, one would advise applications of Sugar Bureau No. 1 mixtures at the rate of 3 cwt. per acre, followed by a top dressing of sulphate of ammonia, 1½ bags per acre.

Mrs. E. Williams' Farm, Eubenangee.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Plant Cane.
Variety.—Badila. **Age of Crop.**—11 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Potash.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
240	240	..	23·4	Assumed Mill Average =	2 6 0	..	..
240	240	90	28·8		2 17 0	5 11 0	..
240	240	180	29·2		3 8 0	5 9 0	..
240	240	270	29·4		3 19 0	5 1 0	..
240	240	360	29·7		4 10 0	4 19 0	..

DISCUSSION.

This experiment was an attempt to repeat the results obtained on an area of similar red volcanic soil at Mr. H. J. Thomas's farm, Bartle Frere, a few years ago.

All plots received uniform applications of sulphate of ammonia and superphosphate, and the potash treatments varied from *nil* to 360 lb. of muriate of potash per acre. The yield increases for the successive potash applications were most interesting.

Crop Increase Due to—	Cane per Acre.
Muriate of potash—	Tons.
90 lb.	5·4
180 lb.	5·8
270 lb.	6·0
360 lb.	6·3

The lightest application brought about a very substantial crop increase, while the addition of 360 lb. per acre only increased the yield by a further 1 ton per acre.

It is recommended that Sugar Bureau No. 3 mixtures be applied uniformly on all red volcanic soils; an application of 3-4 cwt. per acre should prove satisfactory. In addition, plant cane should be top dressed with sulphate of ammonia at the rate of 1½ bags per acre, while ratoons should be given two dressings, each of 1 bag per acre.

J. F. McCutcheon's Farm, Liverpool Ck., Mourilyan.

Soil Type.—Alluvial loam. **Nature of Crop.**—First Ratoon.
Variety.—Badila. **Age of Crop.**—11 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over K.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	160	26·6	Assumed = 14%	1 5 0	..	..
240	240	160	28·1		3 5 0	..	0 5 0
240	480	160	29·9		3 16 0	1 5 0	..
480	240	160	31·0		4 10 0	1 16 0	..
480	480	160	31·9		5 1 0	2 6 0	..

DISCUSSION.

The results recorded above are the yields for the first ratoon crop following the plant cane yields which were reported last year. The land is an area of typical alluvial loam, and the experiment was designed to show the relative values of heavy *v.* light applications of superphosphate and sulphate of ammonia on a soil type which usually gives good results from the use of both of these plantfood materials.

The comparative values for the plant and first ratoon crops are as follows:—

Crop Increase Due to—	Plant Crop.	First Ratoon Crop.
	Tons.	Tons.
Heavy *v.* light.		
Sulphate of ammonia dressing	3·2	2·5
Heavy *v.* light.		
Superphosphate dressing	1·6	1·4

The crop increases were generally in agreement with past experience on soils of this character, though it is noteworthy that better results were obtained from sulphate of ammonia on the plant crop than on the ratoons. Generally the converse is true. Perhaps the results from the second ratoon crop will be able to clarify this point.

As previously, the application of Sugar Bureau No. 1 fertilizer mixtures is to be recommended as a preliminary treatment. These should be followed by top dressings of sulphate of ammonia.

C. Barbera's Farm, Mourliyan.

Soil Type.—Clay loam. **Nature of Crop.**—Plant Cane.

Variety.—Badila. **Age of Crop.**—15 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	19.6	Assumed = 14%	..	..	..
360	360	..	25.9		3 4 0	4 0 0	..
360	..	270	23.1		4 0 0	..	..
..	360	270	22.6		2 15 0	0 14 0	..
360	360	270	27.7		4 17 0	4 9 0	..

DISCUSSION.

This area is probably alluvial in character, and we would expect increased yields from applications of sulphate of ammonia and superphosphate. The results actually show:—

Crop Increase Due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	5·1
Superphosphate	4·6
Muriate of potash	1·8

The results are therefore in strict accordance with our anticipations.

The land was treated with lime at the rate of 2 tons per acre prior to planting, and that has doubtless assisted the crop to respond to the fertilizer added later.

As a recommendation for this type of land we can but repeat our general recommendation for acid alluvial soils:—An initial application of lime if tests show that the land is acid; the application of Sugar Bureau No. 1 fertilizer mixture at the rate of 3-5 cwt. per acre, finally top dressing with sulphate of ammonia at the rate of 1½ bags per acre for plant cane and 2 bags per acre for ratoons.

J. P. Kelleher's Farm, Tully.

Soil Type.—Alluvial clay loam. **Nature of Crop.**—Plant Cane.
Variety.—Badila. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	32·1	12·4	..	..	..
360	360	..	37·5	11·6	3 4 0	..	2 11 0
360	..	180	33·9	11·8	3 9 0	..	2 3 0
..	360	180	35·5	12·1	2 4 0	..	0 12 0
360	360	180	38·7	11·3	4 6 0	..	4 6 0

DISCUSSION.

The soil on which this trial was located could be expected to behave similarly to all alluvial areas in North Queensland, and this is borne out by the following yield increases to the individual plantfood materials:—

Crop Increase Due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	3·2
Superphosphate	4·8
Muriate of potash	1·2

We find a large increase due to phosphate, a smaller though important effect from sulphate of ammonia, and but little influence from the potash. The soil therefore requires a phosphate-rich mixture such as Sugar Bureau No. 1 fertilizer. This should be applied at the rate of 4-5 cwt. per acre, and followed by sulphate of ammonia as top dressing; plant cane should be given 1½-2 bags per acre, and ratoons 2-2½ bags, in two equal applications.

As land of this character tends to become highly acid, the farmer should have it tested at intervals to see whether the use of sulphate of ammonia has made it necessary to lime the land.

The local instructor in cane culture can supply this information to the grower at short notice.

F. J. Landau's Farm, Feluga, Tully.

Soil Type.—Gravelly loam. **Nature of Crop.**—First Ratoon.

Variety.—Badila. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	20·4	16·8	..	..	..
360	360	..	28·3	16·2	3 4 0	3 12 0	..
360	..	180	23·0	16·1	3 9 0	..	1 6 0
..	360	180	25·3	16·5	2 4 0	4 14 0	..
360	360	180	26·9	16·5	4 6 0	5 0 0	..

DISCUSSION.

The gravelly loam soils of the Tully area have shown surprisingly good yields ever since the land was cleared. The secret of this success lies in the consistent use of appropriate fertilizer to maintain the plant food supply which is, in this soil type, relatively low.

The yields recorded above show the need for fertilizer mixtures rich in phosphate, as is seen from the following results for the individual plantfood materials:—

Crop Increase Due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	1·6
Superphosphate	3·9
Muriate of potash	0·6

Sugar Bureau No. 1 mixtures might therefore be regarded as the most suitable manures for this soil type. They should be applied at the rate of 4 cwt. per acre and followed by top dressing with sulphate of ammonia. Plant cane will benefit from 1½ bags of ammonia per acre, while ratoons will make good use of at least 2 bags, applied in two equal dressings.

BURDEKIN DISTRICT.

The cane soils of the Burdekin district are all alluvial in character, and range from sandy loams to clay loams. They constitute a class of soil which is generally of high fertility, and they are notably well supplied with available phosphate and potash. They are, however, rather deficient in humus, and nitrogen.

All plot trials to date have demonstrated the great value of sulphate of ammonia on these lands, and the two returns reported provide further proof of this statement. The benefits for plant cane are very definite where heavy tonnages are harvested, while for successful ratoons, the use of nitrogenous top dressing is indispensable. The average increase in cane yield per acre on the 1936 trials, for the application of 480 lbs. of sulphate of ammonia, was 13·2 tons of cane per acre. Doubtless the realization of the need for fertilizer has been one of the major factors in the great advances in acreage yields, which has been a feature of cane production in this area during recent years. It has also provided one of the most important clues to successful ratooning—a practice which was virtually extinct six years ago; now it is becoming the rule to produce at least one ratoon, while leading growers assert that a second and even third ratoon crop may be grown successfully, provided attention is paid to certain well-defined rules; one of these is an early and adequate application of artificial manures, rich in nitrogen.

It is a well-recognised fact that many of the irrigation waters of the area contain traces of "free alkali"—that is, carbonate of soda. Though generally not present in harmful amounts, the continued use of such waters tends to make the soil alkaline, and disturb its physical structure in such a way as to make it difficult to work. It is a fortunate circumstance that the use of the beneficial manure—sulphate of ammonia produces an acidifying effect in the soil, which successfully neutralizes the free alkali of the waters, and maintains the soil in its original state.

The past growing season was one of extremes—an unusually dry spring and early summer was followed by a beneficial wet season which maintained the crop in excellent condition from January to June. This is reflected in the results recorded herewith.

E. C. Edwards' Farm, Home Hill.

Soil Type.—Alluvial loam. **Nature of Crop.**—First Ratoon.
Variety.—E.K. 28. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Sulphate of Ammonia.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	22·8	15·8	1 11 0	..	..
120	240	120	24·2	15.6	2 8 0	0 10 0	..
240	240	120	28·1	15·3	3 1 0	4 1 0	..
360	240	120	32·4	15·2	3 13 0	8 16 0	..
480	240	120	34·4	15·3	4 6 0	11 5 0	..

DISCUSSION.

The above figures ilustrate very clearly the value of sulphate of ammonia, in converting a modest ratoon crop to a highly profitable one. The following table summarises the yields for both plant and first ratoon crops:—

Treatment.	Plant Cane.	First Ratoo n.
	Tons.	Tons.
No nitrogen	42·1	22·8
480 lb. sulphate of ammonia per acre	48·5	34·4
Increase due to nitrogen	6·4	11·6

While the crop increase on the plant cane was substantial, that for the ratoons is practicably double. The absolute need for nitrogenous top dressings on ratoon cane is thus evident, and the following treatment may be taken as satisfactory for such crops:—Apply an initial dressing of 3 cwt. of Sugar Bureau No. 1 ratooning mixture in a furrow alongside the cane stools; when the ratoon shoots are a foot high, top dress with sulphate of ammonia, at the rate of 1½ bags per acre. A month later, apply a further dressing of sulphate of ammonia at the rate of 1½ bags per acre. Given adequate cultivation and an abundance of soil moisture, no difficulty should be experienced in obtaining yields in excess of 30 tons per acre for first ratoons.

Messrs. C. Hansen and Sons' Farm, Ana Branch, Ayr.

Soil Type.—Grey sandy loam (alluvial).

Nature of Crop.—Plant Cane.

Variety.—E.K. 28.

Age of Crop.—18 months.

RESULTS.

Fertilizer Applied per Acre			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Sulphate of Ammonia.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	120	53·6	Average = 15.5	1 11 0	..	..
120	240	120	61·2		2 8 0	9 12 0	..
240	240	120	66·9		3 1 0	16 16 0	..
360	240	120	65·0		3 13 0	13 11 0	..
480	240	120	68·8		4 6 0	18 3 0	..

DISCUSSION.

The block in which this trial was located gave an excellent germination, and the crop made rapid growth throughout the season. From one plot a yield of 79 tons per acre was harvested. The results from increasing amounts of sulphate of ammonia are somewhat erratic, though the benefits of this manure may be traced to the heaviest application.

We would therefore recommend, for plant cane, an initial application of Sugar Bureau No. 1 planting mixture, at the rate of 3 cwt. per acre, followed by two top dressings of sulphate of ammonia, each of 1 bag per acre.

The value of green manuring on land of this nature is obvious, and growers who follow this practice may be assured of sustantial savings in the purchase of sulphate of ammonia, while crops will not suffer in yield. The use of molasses at the rate of 5 to 8 tons per acre, applied on fallow land, would produce similar benefits.

SOUTHERN DISTRICTS.

During the past season, thirteen farm fertility trials were harvested in the Southern areas. Climatic conditions for the period were far from favourable, and the fact that some interesting crop increases were recorded, even under natural rainfall conditions, is evidence of the need for artificial manures on the soils of these parts.

The benefits from fertilizers which have been recorded in recent years is in distinct contrast to the results obtained when the project was inaugurated, in 1929. That was the period when the canes of the district were stricken with gumming disease, or such resistant varieties as were grown were capable of only modest yields per acre. As a result, the soil was able to supply the requirements of the small crops without the necessity for supplementary additions of plant foods. But since varieties such as P.O.J. 2878 and P.O.J. 213 have been adopted, the greatly increased yields per acre have taken their toll on the natural fertility of the soil, rendering the need for the use of artificial manures imperative.

It is interesting to compare the average yields of "fertilized" and "non-fertilized" plots for all twelve trials:—

	Cane per acre.
"Complete fertilizer" plots	40·8
"No fertilizer" plots	33·9
Average increase due to fertilizer	6·9

These include trials which were conducted under irrigated conditions where, of course, the need for added plant foods is much greater than where the crop depends for its moisture on natural rainfall.

Growers are warned against the acceptance of results obtained for soil types which differ markedly from those on which they are farming. It is obviously erroneous to expect results on red volcanic soils by applying treatments which have proven highly successful on alluvial loams or red sandy forest soils. We would also point out that the absence of payable results from the addition of artificial manures is not proof that the use of these materials is a costly luxury. On the contrary, the fact that our experiments fail to show profitable returns is often sure evidence that the grower on whose farm the trial is located has been a consistent user of just that type of manure which his land most needs; no marked results from the fertilizer we have applied is rather proof that he is continuously deriving the maximum benefit from artificial manures under his particular farming conditions.

Bingera Plantation (Block, KB 2), Bundaberg.

Soil Type.—Light brown loam (shotty). **Nature of Crop.**—Standover First Ratoon.

Variety.—Oramboo. **Age of Crop.**—23 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over Phosphate.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	200	..	35·8	14·8	0 14 0	..	..
300	200	100	45·5	14·9	3 2 0	10 15 0	..
300	200	200	42·5	15·2	3 14 0	8 4 0	..
600	200	100	45·5	15·0	4 12 0	10 0 0	..
600	200	200	42·3	15·5	5 4 0	8 5 0	..

DISCUSSION.

The plant crop from this trial was harvested in 1934, and showed beneficial results for the manurial treatments. The returns for the first ratoon crop are also in evidence, though erratic. It would appear that any yield increases are due mainly to sulphate of ammonia, though the potash application may have exerted its influence.

The most interesting feature of the results is the effect of sulphate of ammonia on the c.c.s. of the crop. Doubtless the cane was over-mature when harvested; but those crops receiving sulphate of ammonia were delayed in maturing, so that they were nearer the peak of c.c.s. when the "no nitrogen" plots were decidedly over-ripe.

This is a feature which growers should bear in mind, and if they know that an early-maturing cane such as Oramboo is to be cut as a standover rather late in the season they should apply a top dressing of sulphate of ammonia just before the wet season, so as to promote further second season's growth and also delay maturity.

Bingera Plantation (Block 5a), Bundaberg.

Soil Type.—Red sandy loam. **Nature of Crop.**—First Ratoon.
Variety.—Oramboo. **Age of Crop.**—14 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Extra Fertilizer over Potash.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	250	22·9	16·6	1 16 0	..	..
300	300	250	35·6	16·1	4 5 0	14 12 0	..
300	600	250	34·5	16·0	4 19 0	11 16 0	..
600	300	250	40·0	15·3	5 15 0	15 1 0	..
600	600	250	39·4	15·5	6 9 0	14 13 0	..

DISCUSSION.

The results from fertilizer recorded on this trial are outstanding. The plant cane harvested in 1935 showed no benefits whatsoever from the manures applied to it; on the ratoons the over-all increase due to fertilizer was 16·5 tons of cane. This is a striking demonstration of the value of manures on ratoon cane, particularly under irrigation.

The major part of the gain is due, of course, to sulphate of ammonia; while the application of 300 lb. per acre brought about a big yield increase, an extra dressing of 300 lb. per acre was accompanied by a further gain of 4·7 tons of cane. One would be safe in applying 4 cwt. per acre of sulphate of ammonia on ratoons under these conditions.

The heaviest applications of sulphate of ammonia are accompanied by a depressed c.c.s. value, but the gain in yield has far more than offset any such slight disadvantage.

Bingera Plantation (Block 30), Bundaberg.

Soil Type.—Red sandy loam. **Nature of Crop.**—Standover First Ratoon.

Variety.—Q. 1098. **Age of Crop.**—24 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over Potash.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	150	63·9	14·4	1 3 0	..	..
300	150	150	70·5	14·2	3 6 0	4 0 0	..
300	300	150	68·7	13·8	3 13 0	..	2 6 0
600	150	150	73·2	13.6	4 16 0	..	0 9 0
600	300	150	72·3	12·8	5 3 0	..	10 6 0

DISCUSSION.

The plant crop of this trial was harvested in 1934, and the ratoons were allowed to stand over. The result has been a very heavy ratoon yield which lodged badly during the past summer, and the c.c.s. has suffered as a consequence. Despite an increased cane yield of almost 10 tons per acre for the heaviest fertilizer application, the greatly depressed c.c.s. of the latter plots has resulted in a loss from the treatment. It is obviously unprofitable to produce crops of cane which are so heavy that lodging is inevitable and the crop cannot thereafter attain a normal c.c.s. value.

One of the outstanding features of the new variety P.O.J. 2878 is its ability to remain upright, even in a heavy crop; this permits of normal maturity and enables the cane to be harvested, with a high c.c.s.

Bingera Plantation (Mitchell's 3, Hill End), Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Standover First Ratoon.

Variety.—N.G. 16. **Age of Crop.**—24 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	57·6	13·8	..	..	..
400	400	..	71·6	14·1	3 12 0	15 10 0	..
400	..	400	76·0	13·9	5 0 0	17 2 0	..
..	400	400	65·4	13·6	3 12 0	3 12 0	..
400	400	400	69·4	13·6	5 18 0	5 15 0	..

DISCUSSION.

When the plant crop was harvested in 1934 the plots receiving the heaviest applications of manure gave the phenomenal yield of over 80 tons of cane per acre. The standover ratoon crop yields are quite as striking. As with the plant cane, sulphate of ammonia has been responsible for the major proportion of the increase—a fact which is repeatedly demonstrated, under irrigated conditions particularly.

This land appears to be able to provide the phosphate and potash demanded by even the heaviest of cane crops, which is evidence of the importance of maintaining an abundance of available plantfood in the soil by consistent manurial applications. Doubtless this has been markedly assisted by the availability of molasses from the mill, which has been applied to the land by this plantation as a standover treatment for many years past.

Qunaba Plantation, Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Plant Cane.
Variety.—P.O.J. 2878. **Age of Crop.**—19 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over Phosphate.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	240	..	39·7	14·9	0 16 0	..	..
160	240	160	38·6	15·0	2 17 0	..	2 19 0
160	240	320	38·7	14·9	3 16 0	..	4 6 0
320	240	160	40·7	14·9	3 13 0	..	1 11 0
320	240	320	39·9	15·0	4 13 0	..	3 0 0

DISCUSSION.

This trial was laid out to determine the value of heavy and light applications of sulphate of ammonia and muriate of potash, with an autumn plant crop on red volcanic soil. While the yields are most satisfactory, having regard for the season, no benefits from any of the fertilizer treatments may be detected. One must therefore conclude that this area is possessed of sufficient available plant food to supply the needs of even a 40-ton crop of cane. It would be interesting to learn what will be the effect on fertility of harvesting a succession of similar crops from this land; of course this can scarcely be determined, as it is the practice of the plantation to see that all crops receive adequate manurial treatment to maintain the fertility of the soil at a satisfactory level.

Messrs. Courtice Bros.' Farm, Barolin Road, Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Standover Plant Cane.

Variety.—P.O.J. 2878. **Age of Crop.**—30 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	53·6	16·1	..	..	..
180	240	..	52·1	15·9	1 19 0	..	5 14 0
180	..	180	54·8	15·9	2 11 0	..	2 7 0
..	240	180	55·2	15·8	1 18 0	..	1 19 0
180	240	180	54·7	16·1	3 1 0	..	1 9 0

DISCUSSION.

The results of this trial supply an excellent example of what the red volcanic soils are able to produce in cane yields now that they are provided with a variety which is suited to the conditions. We have here, also, an illustration of the condition of a soil which has not produced the cane yields in the past that its fertility would assure; as a consequence, the production of a 55-ton crop imposes no severe drain on the plantfood reserves, and the application of artificial manures has had no appreciable influence on the crop yield.

C. M. Jensen's Farm, South Kolan, Bundaberg.

Soil Type.—Brown volcanic loam (shotty). **Nature of Crop.**—First Ratoon.

Variety.—Co. 290. **Age of Crop.**—13 months.

RESULTS.

Fertiliser Applied per Acre.			Crop Yields.		Cost of Fertiliser and Application.	Net Return (per acre) from Fertiliser.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d
..	..	..	30·9	14·3	..	..	..
288	240	..	39·9	14·0	2 11 0	6 13 0	..
288	..	180	40·5	14·0	3 2 0	6 16 0	..
..	240	180	34·5	14·0	1 18 0	1 0 0	..
288	240	180	43·2	14·2	3 13 0	10 13 0	..

DISCUSSION.

The results recorded above afford an excellent example of how ratoons respond to fertilizer, when irrigation is practised. The yields are very satisfactory, and indicate the value of Co. 290 as a variety in these parts. The crop responses to the individual plantfood materials are as follows:—

Crop Increase due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	8·7
Superphosphate	2·7
Muriate of potash	3·3

One would expect to record good results from sulphate of ammonia and potash on this land, which is predominantly basaltic in origin; but we observe in addition definite responses to superphosphate.

In the light of the above data one would recommend the use of Sugar Bureau No. 2 mixtures on soils of this class. Under irrigation, these should be applied at the rate of 5 cwt. per acre. The plant cane should later receive two top dressings of sulphate of ammonia, each of 1 bag per acre; the ratoons could profit from two applications also, each of 1½ bags per acre. It shoud be noted that this advice is based on irrigation practice; for dry land farming, the respective quantities of mixed fertilizer and sulphate of ammonia should be reduced proportionately.

W. Loeskow's Farm, Gooburrum, Bundaberg.

Soil Type.—Red sandy loam. **Nature of Crop.**—First Ratoon.
Variety.—P.O.J. 234. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	21·2	16·1	..	..	..
260	325	..	23·3	16·2	2 11 0	0 18 0	..
260	..	130	22·7	16·3	2 12 0	0 5 0	..
..	325	130	23·4	15·8	1 16 0	0 10 0	..
260	325	130	25·1	16·1	3 7 0	2 8 0	..

DISCUSSION.

The results recorded above for the first ratoon crop of this trial form an interesting contrast to the returns from the plant cane presented last year. A comparison of the yield increases due to the individual plantfood materials is as follows:—

Crop Increase Due to—	Plant Crop.	First Ratoon Crop.
	Tons.	Tons.
Sulphate of ammonia	0·1	1·7
Superphosphate	0·7	2·4
Muriate of potash	0·2	1·8

It is therefore seen that whereas the soil is able to provide the nutrients needed by a modest plant crop following a fallow, the ratoons will be definitely influenced by an application of the correct type of fertilizer.

The results obtained suggest an application of 3-4 cwt. per acre of Sugar Bureau No. 1 mixtures on the sandy forest soils. This initial treatment should be followed by a top dressing of sulphate of ammonia —1-1½ bags per acre for plant cane, and 1½ bags per acre for ratoons.

F. C. Rehbein's Farm, Germantown Rd., Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—First Ratoon.
Variety.—P.O.J. 213. **Age of Crop.**—13 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Potash.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	27·3	14·7	..	..	..
225	240	..	29·0	14·6	2 4 0	..	..
225	240	120	28·4	14·7	2 19 0	..	1 2 0
225	240	240	29·7	14·1	3 13 0	..	2 14 0
225	240	360	32·7	14·1	4 8 0	0 2 0	..

DISCUSSION.

In 1936 we reported the results of this potash trial, which attempted to determine the most profitable application of this plantfood material, on the red volcanic soil, with irrigation. Actually the farmer gave but one or two light waterings to plant and ratoon crops. The relative yield increases for increasingly heavy applications of potash were:—

Crop Increase due to—	Plant Crop.	First Ratoon Crop.
	Tons.	Tons.
Muriate of potash—		
120 lb.	Nil	Nil
240 lb.	Nil	0·7
360 lb.	2·1	4·3

The results were rather erratic, but it is significant that the ratoons responded more definitely to the heavier dressings of potash than did the plant crop. This is, of course, to be expected.

Our standard recommendation for red volcanic loams is therefore borne out by these results:—Sugar Bureau No. 3 mixtures are prepared especially for this soil type, and an application of 3-4 cwt. per acre will generally prove adequate. Top dressing with sulphate of ammonia should follow, particularly in a favourable growing season. Plant cane should be given 1-1½ bags per acre of this manure, and ratoons 1½ bags.

F. Read's Farm, off Barolin Road, Bundaberg.

Soil Type.—Red sandy loam. **Nature of Crop.**—Plant Cane.
Variety.—P.O.J. 213. **Age of Crop.**—19 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	20·1	15·1	..	..	..
240	360	..	22·3	15·3	2 11 0	1 1 0	..
240	..	180	23·7	15·2	2 17 0	2 6 0	..
..	360	180	22·8	15·6	2 3 0	3 2 0	..
240	360	180	24·1	15·2	3 13 0	2 1 0	..

DISCUSSION.

This trial was located on an area of red sandy forest loam, on which we are accustomed to finding a deficiency of available phosphate. The results from the individual plantfood materials were as follows:—

Crop Increase due to—	Cane per Acre.
	Tons.
Sulphate of ammonia	1·3
Superphosphate	0·4
Muriate of potash	1·8

It will be observed that there has been but slight benefit from superphosphate, while potash appears to have had the greatest influence on yield.

Before commenting further on these results, the results of the ratoon crop will be awaited.

Windermere Plantation, Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Standover Second Ratoon.

Variety.—P.O.J. 213. **Age of Crop.**—21 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	23·5	12·7	..	..	..
300	240	..	33·8	12·8	2 12 0	8 1 0	..
300	..	180	33·4	12·6	3 3 0	6 2 0	..
..	240	180	23·0	12·4	1 18 0	..	3 8 0
300	240	180	33·9	12·7	3 14 0	6 11 0	..

DISCUSSION.

The red volcanic loam usually gives response to potash, and sometimes to sulphate of ammonia, particularly on ratoons. The results recorded above show outstanding benefits from the use of sulphate of ammonia on a standover crop of ratoons. The visible effects of nitrogen on the first year's growth were so striking that it was intended to apply a further light application in spring, 1935. However, the cane was rather tangled and difficult to penetrate, so this intention was abandoned. At harvest time, the canes on all plots which had received sulphate of ammonia were lodged, while the remaining cane stood erect.

The net gain in cane tonnage from the application of 300 lb. of ammonia was almost 11 tons, while phosphate and potash were without influence on the yield.

We would therefore repeat our recommendation of a modest application of Sugar Bureau No. 3 mixtures on red volcanic lands, followed by top dressings of sulphate of ammonia, notably on ratoons.

G. H. O'Rourke's Farm, Maroochy River, via Yandina.

Soil Type.—Alluvial sandy loam. **Nature of Crop.**—First Ratoon.
Variety.—Q. 813. **Age of Crop.**—12 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from Fertilizer.	
Sulphate of Ammonia. (N)	Superphosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	..	..	12·8	15·5	..	..	..
300	300	..	18·9	15·5	2 14 0	6 8 0	..
300	..	180	20·8	15·9	3 3 0	9 16 0	..
..	300	180	14·6	15·7	2 1 0	1 7 0	..
300	300	180	21·1	16·1	3 16 0	10 2 0	..

DISCUSSION.

The area on which this trial was located is typical of much of the land of the Maroochy River. The cane on the lower end of the block suffered from over-wet conditions during periods of heavy rain.

However, distinctly beneficial results have attended the applications of fertilizer. The following table compares the relative crop increases for the three plantfood materials employed, on both plant and ratoon crops:—

Crop Increase due to—	Plant Crop.	First Ratoon Crop.
	Tons.	Tons.
Sulphate of ammonia	2·1	6·5
Superphosphate	Nil	0·3
Muriate of potash	2·0	2·2

Again we have an excellent example of the relative value of sulphate of ammonia on plant and ratoon cane. Though the increase in yield, due to 300 lb. per acre of this manure, was only 2 tons on the plant crop, it increased to 6½ tons on the first ratoons. Even greater results might be expected with older ratoons. The most significant feature of the experiment is that fertilizers have converted a crop failure into a very reasonable ratoon. The slight gain from muriate of potash is rather unusual for alluvial lands, and is possibly related to the past fertilizer history of the farm.

In the light of these results, we would repeat the recommendations issued last year in connection with this trial. Sugar Bureau No. 2 mixtures should be applied to all crops, at the rate of 4 cwt. per acre. Subsequent top dressings of sulphate of ammonia should also be given, at the rate of 1½ bags per acre for plant cane, and 2 bags per acre for ratoons.

J. H. Brand's Farm, Huxley Road, Childers.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Plant Cane.
Variety.—P.O.J. 2878. **Age of Crop.**—20 months.

RESULTS.

Fertilizer Applied per Acre.			Crop Yields.		Cost of Fertilizer and Application.	Net Return (per acre) from extra Fertilizer over Phosphate.	
Sulphate of Ammonia. (N)	Super-phosphate. (P)	Muriate of Potash. (K)	Cane per Acre.	C.C.S. in Cane.		Profit.	Loss.
Lb.	Lb.	Lb.	Tons.	Per cent.	£ s. d.	£ s. d.	£ s. d.
..	250	..	30·6	12·7	0 16 0	..	..
200	250	200	30·7	13·4	3 6 0	0 15 0	..
200	250	400	30·8	13·0	4 10 0	..	2 2 0
400	250	200	31·0	12·9	4 7 0	..	2 3 0
400	250	400	31·8	13·8	5 11 0	1 11 0	..

DISCUSSION.

The trial on this farm was laid down with the idea of determining the value of light *v* heavy dressings of sulphate of ammonia and potash on the Childers red volcanic loam. The results obtained show no definite benefits from either plantfood material, and it must be concluded that, in the growing season experienced, the soil was able to supply the crop's needs of all plantfoods. The results were probably interfered with by the application of 150 lb. of sulphate of ammonia which was spread uniformly on all plots, in error.

It should be recorded that the crop harvested in the Isis district during the year was produced in one of the most unfavourable seasons of recent years.

Varietal Trials.

In the October, 1936, issue of the Quarterly Bulletin we presented the results of seven varietal trials which had been harvested from farms in the Northern, Central, and Southern districts. Since these results were published, we have the yields from further four trials, and these are discussed in detail in the succeeding pages.

FIG. 34.—Illustrating the relative growth of Badila (left) and Q. 2 (right) in the trial at Edmonton. The results are recorded on page 117.

The outstanding features of the trials this year have been—

1. The distinct promise shown by a new seedling bred by the Bureau, which has received the serial number Q. 2. The main features of this variety were discussed in the October Bulletin.

For those growers in districts where gumming disease exists, we regret to advise that the variety is quite susceptible to this disease, and the propagation of the cane in those areas cannot be allowed.

2. Despite good cane tonnages, the variety P.O.J. 2725 did not impress favourably in the Northern districts. This is unfortunate, for the variety shows wonderful ratooning vigour, and is highly resistant to most major diseases.

3. Co. 290 and P.O.J. 2878 continue to demonstrate their yielding ability in the Southern districts, and there can be no doubt regarding the value of these canes for those parts. Both are highly resistant to gumming disease, while Co. 290 may also be grown successfully in areas where Fiji disease exists. P.O.J. 2878 is, however, highly susceptible to the latter, and its propagation cannot be endorsed in the Maryborough district for this reason. P.O.J. 2878 is virtually the sole variety in the Isis district, and its performance during the past unfavourable year warrants the distinction.

FIG. 35.—The growth characteristics of Q. 2 are clearly demonstrated in this illustration. The free trashing habit and erect growth are noteworthy. The farmer standing in front of the cane is well over 6 feet in height.

A CORRECTION.

We wish to apologise for the error committed in presenting the results of Mr. H. A. Ilett's trial, Childers, in the October Bulletin, and would request that growers interested in these returns substitute the data presented at this time.

P. Simmond's Farm, Wright's Creek, Edmonton.

Soil Type.—Schist alluvial loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—14 months.

YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Badila	35·	14·1
Q.2	**44·3**	**16·3**

DISCUSSION.

Q. 2 gave a slow germination, while the Badila struck well, and produced a good stand. During the late summer and autumn Q. 2 made remarkable progress, and outstripped the standard cane. It is interesting to note that the Badila suffered considerable rat damage, while the Q. 2 remained untouched.

The yields indicate a definite superiority for Q. 2 under these conditions. It gave a crop 8½ tons heavier than the Badila, while the c.c.s. value was 2·2 units higher.

Despite the heavy tonnage and length of stick of Q. 2, not one stool was lodged at harvest time. The characteristic free trashing and upright habit of the Q. 2 is shown in the accompanying illustrations, pp. 115, 116.

Messrs. C. D. and H. D. Buss's Farm, Oakwood, Bundaberg.

Soil Type.—Red forest loam. **Nature of Crop.**—Second Ratoon.
Age of Crop.—14 months.

YIELDS.

Variety.	Plant Cane.		First Ratoon.		Second Ratoon.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in in Cane.	Cane per Acre.	C.C.S. in in Cane.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
M. 1900 ..	28·3	13·0	23·1	16·7	18·3	17·0
P.O.J. 234 ..	30·5	**15·3**	25·9	16·2	23·7	16·2
P.O.J. 2725 ..	39·1	13·2	27·0	**17·6**	28·7	**17·1**
P.O.J. 2878 ..	37·5	11·9	28·4	16·7	28·7	17·0
Co. 290 ..	**39·2**	13·5	**38·9**	15·0	**29·2**	15·9

DISCUSSION.

This trial has yielded most interesting figures for the three crops which have now been harvested. Returns for all crops are tabulated above.

Co. 290 has given consistently the highest cane yield for each crop. On the first ratoon yields, it was distinctly superior to all other varieties, though on the plant and second ratoon crops, both P.O.J. 2878 and 2725 were but little inferior. Having regard for the better c.c.s. values of the latter canes, one would recommend that each of the varieties be further tested under these conditions. If it were the farmer's practice to harvest his cane as a standover crop, then P.O.J. 2878 should be selected for the purpose. Co. 290 would possess greater merit as a one-year cane.

H. A. Ilett's Farm, Appletree Creek, Childers.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Standover Plant Cane.

Age of Crop.—23 months.

YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
P.O.J. 2883	33·0	15·4
B. 417	36·3	**15·5**
P.O.J. 2725	36·6	15·0
P.O.J. 2940	40·6	15·4
P.O.J. 2878	**43·5**	14·9

DISCUSSION.

We regret that the results for this trial were incorrectly reported in the October number of the Bulletin.

Our general conclusions are not affected, however, and P.O.J. 2878, the standard variety of the Isis district, is superior to all others. P.O.J. 2940 was second in cane yield, and highest in c.c.s. value. This cane, unfortunately, often gives a poor strike, and we prefer to make further trials before expressing an opinion as to its true worth. P.O.J. 2883 did not show to advantage in the plant crop on this trial.

J. Young's Farm, Burnett Heads Road, Bundaberg.

Soil Type.—Red volcanic loam. **Nature of Crop.**—Second Ratoon.
Age of Crop.—10 months.

YIELDS.

Variety.	Plant Cane.		First Ratoon.		Second Ratoon.	
	Cane per Acre.	C.C.S. in Cane.	Cane per Acre.	C.C.S. in Cane.	Cane per Cane.	C.C.S. in Cane.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.
P.O.J. 979 ..	26·6	13·8	23·0	14·0	13·0	13·0
P.O.J. 234 ..	27·9	**15·0**	29·1	**14·9**	13·7	**14·2**
P.O.J. 213 ..	26·7	13·7	32·7	14·2	16·6	13·0
Co. 281 ..	30·4	12·4	32·8	14·5	15·5	13·7
Co. 290 ..	**37·2**	14·7	**41·9**	14·5	**17·1**	14·1

DISCUSSION.

This trial included five of the "thin" gum-resistant varieties which emerged successfully from the disease-resistance trials conducted by our pathologists.

On the red volcanic soil, Co. 290 has proven superior in cane yield on all three crops, while P.O.J. 234 has shown consistently the highest c.c.s. result. One must conclude that Co. 290 is the most suitable variety, as a one-year cane, under these conditions. Though P.O.J. 213 is still preferred to the Indian cane by many growers on these lands, it is felt that Co. 290 will grow rapidly in popularity; the figures obtained from this trial certainly warrant a substantial increase in the area devoted to this variety. Farmers are a little afraid of the manner in which Co. 290 reacts to a prolonged dry spell; but one must accept the facts as disclosed by weighbridge and laboratory figures, which demonstrate that the tonnages and returns for this cane are almost invariably superior to all other varieties.

R. E. Baumgart's Farm, Island Plantation, Maryborough.

Soil Type.—Alluvial clay loam. **Nature of Crop.**—Plant Cane.
Age of Crop.—14 months.

YIELDS.

Variety.	Cane per Acre.	C.C.S. in Cane.
	Tons.	Per cent.
Korpi	27·1	**16·5**
P.O.J. 2722	27·2	**16·5**
Mahona	27·3	14·8
M. 1900	**29·8**	15·2

DISCUSSION.

This farm is located in an area where Fiji disease has taken heavy toll of the old standard varieties, notably M. 1900. An attempt was made to determine the relative yielding capacity of the new varieties, Korpi and P.O.J. 2722, against the older canes.

The cane yields show little variation, though M. 1900 appeared slightly the best. In c.c.s., the new canes were outstanding, though it must be admitted that the cane was cut late when Mahona would certainly be over-mature.

DAVID WHYTE, Government Printer, Brisbane.